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High Average Power Ytterbium Lasers

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The low quantum defect of Yb:YAG offers many advantages over Nd:YAG for average power applications that require good beam quality and short pulses. We have demonstrated over 400 Watts of CW power and 100 Watts of Q-switched power at 1030 nm with an end-pumped geometry using an array of 941 nm diodes as our pumped source and a fused silica lens duct for focusing of the pump light into the rod. Our unique pumping geometry and optical components provide the necessary pump intensities required to lase quasi-three level laser materials, such as Yb:YAG. Quasi-three level materials, such as Yb:YAG, are of interest in many applications that require reduced waste heat along with good beam quality. The performance levels obtained with this compact laser system have many uses in the industrial and medical communities. We report here on our recent experimental results, theoretical modeling, and future plans.

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